APPENDIX L

UTILTIES INFORMATION

Coyote Valley Specific Plan

City of San Jose

Utility and Service Report

March 2007

HMH ENGINEERS

1.0 SANITARY SEWER SYSTEM

Existing Facilities

The City of San Jose provides sewage treatment for the Coyote Valley area at the San Jose/Santa Clara Water Pollution Control Plant (WPCP). The Plant is a regional facility located in Alviso that provides primary, secondary, and tertiary wastewater treatment for the City of San Jose and several surrounding cities and sanitation districts.

Existing public sanitary sewer facilities are currently limited to the North Coyote area, while properties south of the City's Urban Service Area Boundary rely upon private on-site systems and wastewater treatment, typically septic tanks and leach fields.

Currently, in Bailey Avenue there is a 12-inch sewer west of Santa Teresa and a 15-inch sewer east of Santa Teresa that connect to a 48-inch reinforced concrete pipe (RCP) sewer trunk that has been lined with a 38-inch inside diameter high-density poly-ethylene (HDPE) liner at the Santa Teresa Boulevard intersection. This 38-inch diameter trunk runs north in Santa Teresa, increasing in size to a 54-inch RCP (with a 46-inch inside diameter HDPE-liner) near the Fisher Creek crossing, and changing again to a 42-inch trunk that was micro-tunneled through Tulare Hill in 2001.

This line connects to the south end of the Monterey-Riverside Sewer System at the 27- and 18-inch sewer mains roughly 500 linear feet south of Bayliss Drive. From Bayliss Drive, 24-, 27-, and 30-inch sewer mains of the Monterey-Riverside system continue in Santa Teresa Boulevard, Cottle Road, Beswich Drive, Bangor Avenue, Lean Avenue, Chynoweth Avenue, Snell Avenue, Hillsdale Avenue, and Monterey Highway before connecting to the 54-inch sewer on Monterey Road, allowing effluent to flow to the San José/Santa Clara WPCP.

The WPCP is currently operating under a 120 million gallon per day (mgd) average dry weather effluent flow (mgd ADWEF) constraint. The City of San Jose developed the South Bay Action Plan and the Clean Bay Strategy, which details their control strategy to reduce effluent discharges to the South San Francisco Bay. Before the effluent exceeds this amount, the WPCP must expand its recycled water plan to reuse more of its treated effluent. There is an opportunity to implement the use of recycled water with this project as a strategy to reduce peak discharges entering the WPCP and ultimately, the South Bay.

Design Objectives

The overall goal is to design a cost effective sanitary sewer system by fulfilling the following objectives.

- Minimize deep trenching and need for pump stations by following natural grade patterns

- Utilize existing sewer facilities
- Remain within the City's allocated treatment capacity rights of the WPCP.
- Stay below the WPCP ADWEF capacity cap of 120 mgd
- Enhance flexibility in operation of the system, i.e. ability to bypass portions of the system that need maintenance, repair, or rehabilitation

Design Criteria

The sanitary sewer system for the Coyote Valley Specific Plan has been master-planned in accordance with the following design criteria and guidelines:

- Average daily flow for residential land use = 240 gallons per day for detached single family resident units (and a proportionate reduction for multiple family attached residential units) based on City criteria.
- Average daily flow for commercial building use = 0.5 gallons per day per square foot for based on City criteria.
- Average daily flow for office/research/development workplaces = 0.18 gallons per day per square foot based on City criteria.
- Peaking factor, $PF = 2.5\ (Q_a)^{-0.1}$ where:

  Q_a = average daily flow in million gallons per day (mgd), the sum of the product of unit factors and residential units or industrial acreages.

  $Q_p = PF\ (Q_a) = 2.5\ (Q_a)^{0.9}$, where Q_p = peak flow rate in million gallons per day (mgd)
- Sewers shall be designed for peak flow rate not to exceed 2/3 full pipe
- Minimum slope of pipe S = 0.006 (for 6-in. pipe with minimum velocity flowing ⅔ full with Manning's n = 0.013):

  S = 0.020 (for 4-in. lateral)

  S = 0.010 (for 6-in. lateral)
- Minimum peak flow velocity in pipe (flowing half full) = 2.5 ft/s (where feasible); If minimum velocity of 2.5 ft/s is not feasible, minimum slope = 0.010 (6-in. pipe).
- Minimum advisable low flow velocity = 2.0 ft/s (flushing velocity)
- Depth of Cover from finish grade to top of pipe:

  Minimum cover = 3.5 ft (mains)

  Minimum cover = 3.0 ft (laterals)

  Since this concept plan includes major "backbone" sewer trunk lines only, these lines generally have a minimum 8 ft of cover to allow future connections from subdivision feeders and service laterals.
- Minimum pipe diameters:

  D = 8 in. (for industrial mains)

  D = 6 in. (for residential mains)

D = 4 in. (for laterals, which are not included in this conceptual plan.

- Manning's Roughness Coefficient, "n" value – pipe friction loss factor:
  "n" value = 0.013 for reinforced concrete (RCP) or vitrified clay (VCP) pipe,
  "n" value = 0.010 for polyvinyl chloride (PVC) pipe
- Manholes shall be used where the sewer main: 1) intersects with another sewer main, 2) changes horizontal and/or vertical direction, and 3) changes pipe size.
- Typical manhole spacing = 400 ft to 450 ft; Maximum manhole spacing = 450 ft. However, for this study, average manhole spacing is assumed to be 300 ft based on the proposed sanitary sewer layout.
- Change in flow direction in a manhole generally should not exceed 90 degrees.
- Drop across manholes in which change in flow direction approaches 90 degrees = 0.1 ft (when fall is available)
- Small diameter side sewer main connections to a manhole shall be made a minimum 0.2 ft above the invert of the through pipe
- A sewer main or lateral shall not connect to a manhole higher than the crown of the through pipe unless the connection is made 2.5 feet or more above the manhole invert and is made with an outside drop connection.

Projected average wastewater flows for the CVSP development at buildout were estimated to be 8.6 mgd; peak projected flows were estimated to be 17 mgd. These forecasts are documented in greater detail in the table below. The use of recycled water on this project could offset the 8.6 mgd projected average daily flows generated by the project and reduce the ADWEF to the Bay.

ESTIMATE OF WASTEWATER TO BE GENERATED

Land Use	Approx. No. Units/Sq. Ft.	Generation Rate	Amount Generated
Single-Family Detached	6,750	240 gpd	1.6 mgd
Multi-Family Attached	19,650	160 gpd	3.1 mgd
Commercial	2.66 million sq. ft.	0.5 gpd/sq. ft.	1.3 mgd
R&D/Office (Workplace)	14.2 million sq. ft.	0.18 gpd/sq. ft.	2.6 mgd
Total Average Daily Flow			**8.6 mgd**
Peak Flow Based Upon City Formula			**17.3 mgd**

sq. ft. = square feet
gpd = gallons per day
mgd = million gallons per day

Source: David J. Powers and Associates and City of San Jose

Proposed System

The Coyote Valley sanitary sewer system shown in Exhibit 1 will consist of approximately 100,000 ft of pipe distributed along major arterial and collector roadways within the Land Use Plan. This length includes "backbone" sewer trunks and collectors and does not include subdivision feeders, service laterals, and septic tank/leach field abandonment. The backbone system utilizes existing facilities wherever possible to minimize costs.

The main sewer trunk line would begin near the proposed intersection of Palm Avenue and Santa Teresa Boulevard and continue northward through the development to a connection with the existing 38-in. sewer main in Santa Teresa Boulevard, just north of the Coyote Valley Lake. Primary sewer collectors in this concept plan would generally follow the natural grade patterns of the valley and flow in an east-west direction to the proposed sewer trunk line.

No sanitary sewer pump stations are anticipated as part of the public system. The plan also includes removal of approximately 1,000 ft of existing 48-in. sewer in Santa Teresa Blvd and approximately 3,600 ft of existing 12- to 21 in. sewer in Bailey Avenue to accommodate construction of the Lake.

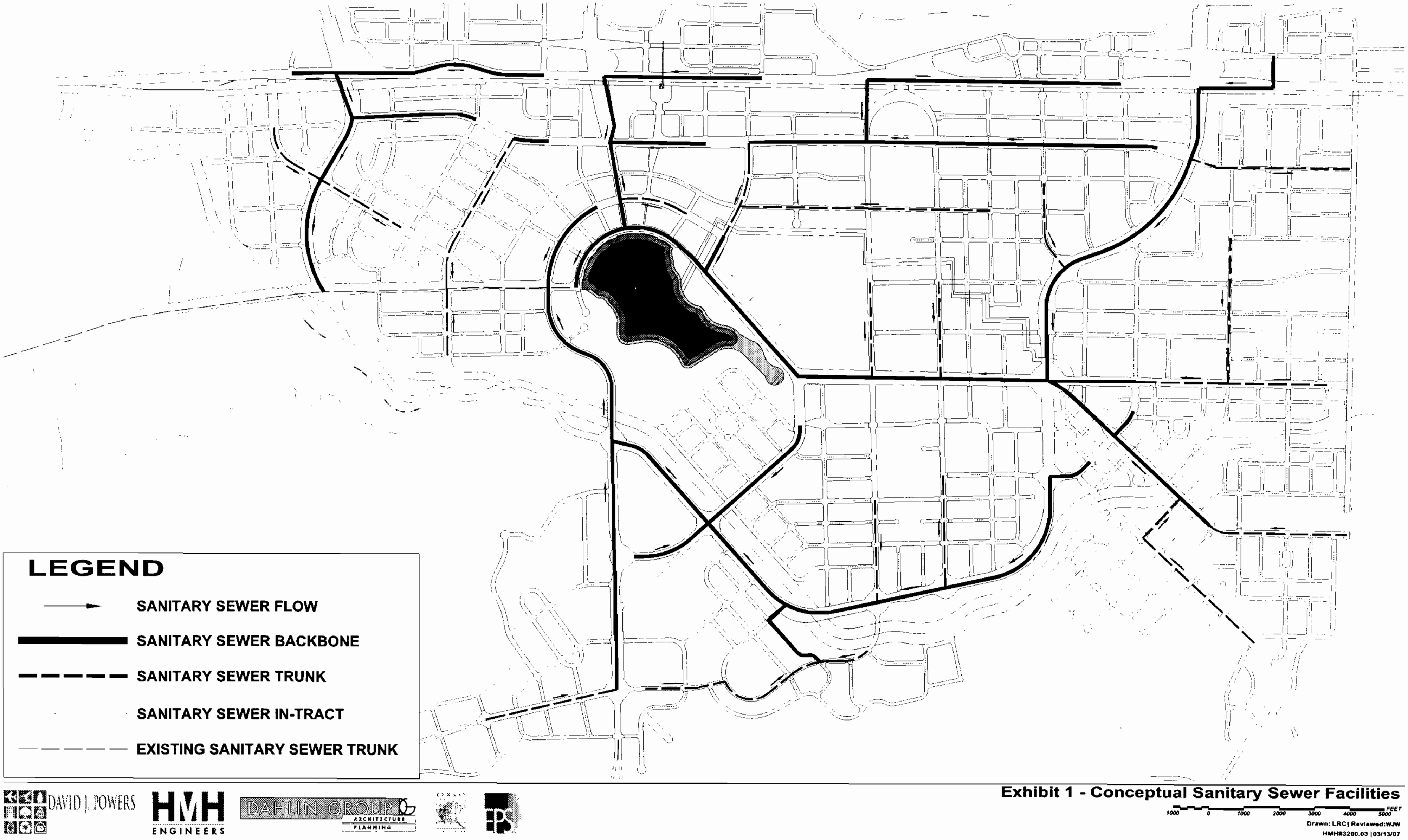


Exhibit 1 - Conceptual Sanitary Sewer Facilities

2.0 WATER SUPPLY

Existing Systems

The Coyote Valley Specific Plan area designated by the City of San Jose for Urban Services is bounded by Tulare Hill to the north, Palm Avenue to the south, U. S. 101 to the east, and the Santa Cruz Mountains to the west. The City of San Jose Municipal Water Division and Great Oaks Water Company currently provide water service to certain areas within North Coyote Valley. The Mid-Coyote and Southern Greenbelt areas located south of the City's Urban Service Area Boundary do not currently receive City water. These areas rely upon private wells for potable water supply.

San Jose Muni Water's facilities include three wells and pump stations located adjacent to the Union Pacific Railroad, north of Bailey Avenue, and a 3.6 million gallon steel water tank located in an easement on IBM property. An existing 18" public water main is located in Bailey Avenue. Santa Teresa Boulevard contains a 12" water main, extending approximately 4,170 feet north from Bailey Avenue, and an 18" water main from Bailey Avenue to Tulare Hill. The 18" main extends west from Santa Teresa along the north edge of Laguna Seca and up the the maintenance access road to connect to the tank.

Great Oaks Water Company currently provides water service to IBM's existing water tank in the hills north of the existing Santa Teresa Lab on Bailey Avenue. Great Oaks also has a 20" main in Santa Teresa Boulevard, from Bayliss Avenue to Bailey Avenue in the North Coyote Valley.

Design Objectives

- To meet applicable design codes and criteria
- To achieve and maintain a balanced demand and distribution of water service over the entire development area
- Supply redundancy/reliability in the system
- To provide water to Coyote Valley Water System during peak periods when the peak demand rate exceeds the well pump capacity
- To provide and receive water to and from the system during low demand periods
- To meet City of San Jose and NFPA requirements for operational, fire protection, and emergency storage volumes

Design Criteria

When it is decided which water purveyor will provide service to areas of the Coyote Valley Specific Plan, the purveyor(s) will determine specific improvements needed to serve the development areas. For planning purposes, a preliminary system design has been developed, and is described below. This proposed system has been developed based upon the following water distribution system design criteria:

- Average Daily Demand = 55 (gpcd) for residential use.
- Average Daily Demand = 30 gallons per capita per day commercial, retail and school uses.
- Maximum Daily Demand = 2.0 x Average Daily Demand for residential and 2.2 x Average Daily Demand for non-residential uses
- Peak Hour Demand = 2.5 x Average Daily Demand
- Fire Flow = 4500 gpm for 4 hours minimum (Commercial) (SJFD)
- Fire Flow = 1500 gpm for 4 hours minimum (Residential) (SJFD)
- Minimum normal operating pressure = 25 psi (Muni Code)
- Minimum residual pressure = 20 psi while under Maximum Hourly Demand or Average Day Demand plus Fire Flow, (California Safe Drinking Water Act)
- Minimum residual pressure = 15 psi (UPC)
- Minimum design residual service pressure = 40 psi (under normal demands)
- Maximum static service pressure = 80 psi without pressure regulators (UPC)
- Maximum pressure = 150 (Muni Code)

Technical issues to consider for water storage tank design are as follows:

- Tank Site Geology
- Distance from distribution system
- Elevation to meet required pressure
- Visual Impact
- Access and Constructability

Water Demand and Supply Alternatives

Water demand and supply alternatives are described in the Water Supply Evaluation.

Proposed System

<u>Water Distribution Network</u>

The Coyote Valley Water System shown on Exhibit 2 would consist of a backbone network of approximately 150,000 LF of 12-inch to 18-inch water pipe distributed along major roadways proposed in the Land Use Plan. Additional lengths of 12-inch and smaller diameter pipe will also distribute the water in in-tract roadways and private easements. This system would be divided into three primary interconnected service zones of approximate equal acreage. These service zones are identified as the North Coyote Zone, West Coyote Zone and South Coyote Zone, and would be connected by a series of water system inter-ties. Along with meeting applicable design codes and criteria, the system would maintain balanced distribution of water service by the inclusion of at least one storage tank and three well/pump stations per zone. A minimum of two interconnections are planned between each zone that would allow independent function from one zone to another zone under normal conditions, and would also provide supplementary supply from an adjacent zone for planned maintenance activities or if pressures drop below minimums due to an emergency event.

Water System Pump Station

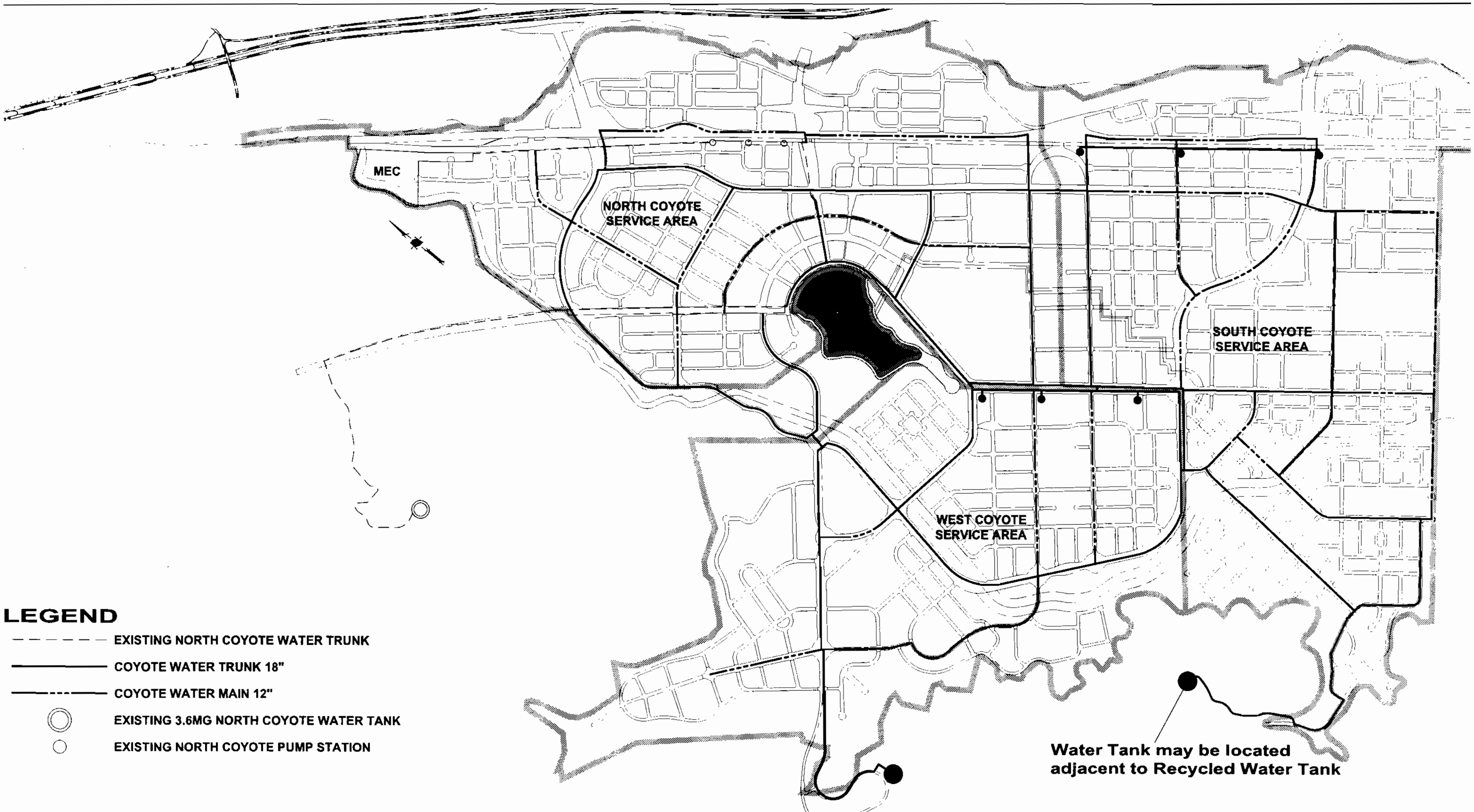
It is proposed that each of the three zones would draw water from the groundwater basin from wells and pumps stations similar to recently constructed wells and pump stations in the North Coyote Valley area. To supply the estimated maximum day demand for each zone of 5,100 gpm, three well/pump stations would be required per zone. Based upon testing for the existing wells, the estimated yield for each pump station is projected to be 3,000 gallons per minute (gpm). Subsequently, safe yield for wells is estimated to be approximately 2,000 gpm, based upon these tests. The estimated maximum day demand for each pump station will be approximately 1,700 gpm, which will be less than the estimated safe yield of 2,000 gpm. This system may require at least one well on standby in case of well failure in the summer.

The three basic components of a pump station are the mechanical system, electrical system, and facility/site improvements. The mechanical system would be comprised of a well, pump, motor, hydro-pneumatic tank or surge anticipator valve, and associated piping valves and fittings. The electrical system would include the motor control center (MCC) and main switchboard, emergency generator, instrumentation, controls and remote telemetry unit. The facility/site improvements could consist of a building, access road, maintenance yard, vehicle parking area, landscaping, fencing and screen walls, as well as site drainage, which would also serve as the water surge discharge point.

Water Storage Tank and Access Road

In order to provide sufficient storage for the Coyote Valley Water System during peak periods when the demand rate exceeds well pump capacity, water storage tanks have been assigned to each service zone in the North, West, and South Coyote Valley areas. The North Coyote Water Tank was recently constructed in the western foothills on IBM property southwest of Santa Teresa Boulevard at a base elevation of 455 ft. Two additional storage tanks have been preliminarily sized to serve the remaining operational demand of the proposed development, and to meet the City of San Jose requirements for fire protection storage and emergency storage. The West Coyote Water Tank, with a proposed base elevation of 500 ft, is proposed to be located along the current alignment of Bailey Avenue as it heads west and ascends over the hill towards Calero Reservoir. The South Coyote Water Tank could be located at the west end of Palm Avenue, potentially along the existing Santa Clara Valley Water District maintenance road, at an approximate base elevation of 520 ft.

The two main functions of the water storage tanks are to equalize supply and demand over periods of varying consumption and to supply water during equipment maintenance or failure, or for fire events or other emergencies. The water tanks have been sized to be approximately 4 million gallons each to include the reserve for domestic consumption, the fire flow required by San Jose Fire Department and appropriate factors of safety.



DAVID J. POWERS HMH ENGINEERS DAHLIN GROUP ARCHITECTURE PLANNING EPS

Exhibit 2 - Conceptual Potable Water System

1000 0 1000 2000 3000 4000 5000 FEET

Drawn: LRC | Reviewed: WJW
HMH#3200.03 | 03/13/07

3.0 RECYCLED WATER

Existing Facilities

Recycled water facilities in Coyote Valley are limited to the Silver Creek Pipeline Extension that was recently constructed to serve the Edenvale area and Metcalf Energy Center (MEC). This seven-mile-long recycled water pipeline was constructed in two segments. The northern segment tied into an existing pipeline in Silver Creek Road at Yerba Buena Road and continued southwest along Silver Creek Valley Road, where it terminated at Hellyer Avenue in the Edenvale East industrial area. The southern segment began at the existing pipeline along Hellyer Avenue, ran west along Silicon Valley Boulevard, and continued south along Monterey Highway to its terminus at Blanchard Road in North Coyote Valley to serve MEC. The total capacity of the Silver Creek Pipeline is 15 mgd and would be the source of recycled water for this project.

Design Objectives

The main objective of implementing the South Bay Water Recycling Program on this project is to augment the use of potable water with recycled water and to reduce flows of treated effluent to the South San Francisco Bay.

Potential uses for recycled water on the CVSP project include landscape irrigation for the following land uses:

- Parks
- Schools
- Open space
- Frontages of multi-family residential areas
- Commercial and industrial land uses
- Street medians and other planted areas

Other potential uses are as follows.

- Filling and replenishing Coyote Lake
- Groundwater recharge

Design Criteria

All irrigation systems for landscaped areas more than ten thousand square feet (10,000 SF) will be designed and installed to allow for current and future use of recycled water.

All irrigation systems will be metered separately from the potable water supply system, and no cross-connections are allowed.

All irrigation systems must be designed to prevent irrigation of recycled water within 50 ft of any domestic water supply well. In addition, recycled water impoundments must be located at least 1,000 feet (horizontal separation) from any domestic water supply well.

Landscape irrigation application rate and replenishment water rate for Coyote Lake will be based on the peak monthly (July) rate of 0.24 in/day of applied water and distributed according to evapotranspiration (ETo) data from the California Irrigation Management Information System (CIMIS) stations in San Jose and Morgan Hill.

Minimum supply pressure = 45 psi (below normal operating pressure)

Average supply pressure = 60 psi to 130 psi (SBWR system provided pressure)

Pipe Class and Diameter

- Constant Pressure Polyvinyl Chloride Pipe (PVC) shall be Schedule 40 or greater for 1-1/2 –inch diameter or smaller
- Intermittent Pressure PVC lateral shall be Class 315 or greater for 2-inch diameter and larger
- Copper Piping shall be Type "K" or greater for all size pipe diameters

Depth of Cover from Finish Grade to Top of Pipe (for on-site systems)

- Minimum = 1.0 ft (Intermittent Pressure), for all size pipe diameters
- Minimum = 1.5 ft (Constant Pressure), for 2.5-inch diameter and smaller

Minimum = 2.0 ft (Constant pressure), for 3-inch diameter and larger

Proposed System

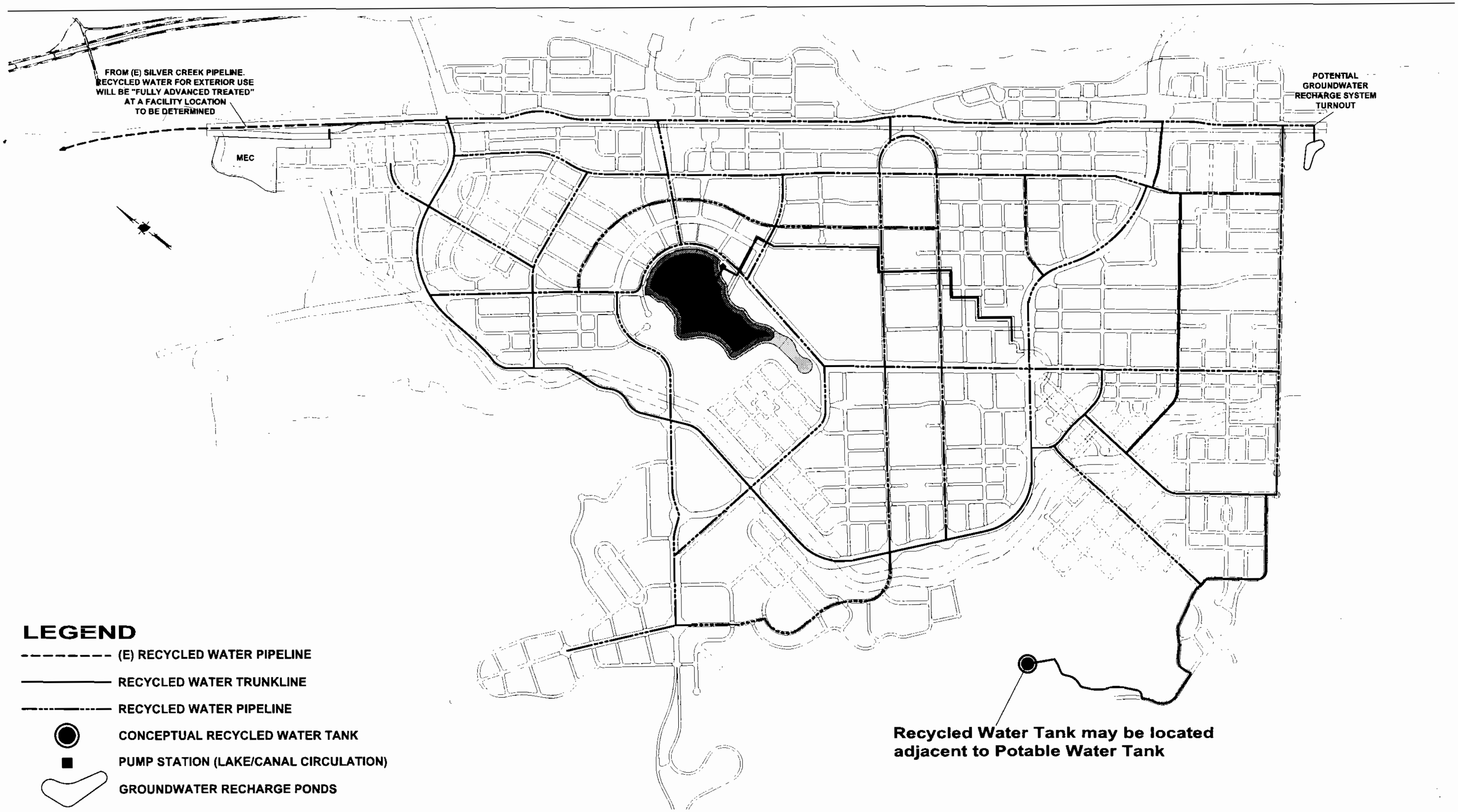
The Coyote Valley Recycled Water System (see Exhibit 3) would consist of a backbone network of approximately 160,000 LF of water pipe distributed along major roadways proposed in the Land Use Plan. Similar to the proposed potable water distribution system, additional lengths of smaller diameter pipe will also distribute recycled-water through the in-tract roadways and private easements.

To meet peak demands and deliver recycled water during emergencies or shutdowns of the existing recycled water lines, a 3.0 MG recycled water tank is proposed at the same site as potable water tank, along the existing Santa Clara Valley Water District maintenance road at the west end of Palm Avenue, at an approximate base elevation of 520 ft.

Due to the Coyote Groundwater Subbasin being considered an unconfined aquifer, the SCVWD has concluded that all recycled water used in Coyote Valley that could percolate into the groundwater basin should be fully advanced treated to protect water quality in the basin. The disinfected tertiary treated water currently provided from the South Bay Water Recycling facility should be treated further to a "fully advanced treated" level prior to using the recycled water in Coyote Valley for landscape and agricultural irrigation and for groundwater recharge.

Based on studies conducted by SCVWD, this fully advanced treatment will consist of applying microfiltration, reverse osmosis, ultraviolet treatment or similarly effective processes to the tertiary treated water from the WPCP. The SCVWD and South Bay Water Recycling Program staffs have identified three general options to accomplish this treatment.

- Provide additional treatment of the entire effluent stream at the WPCP facility near Alviso.
- Provide partial treatment at the WPCP facility near Alviso and provide the remaining treatment at satellite facilities in Coyote Valley.
- Provide additional treatment entirely at a satellite facility in Coyote Valley.



DAVID J. POWERS | HMH ENGINEERS | DAHLIN GROUP ARCHITECTURE PLANNING | EPS

Exhibit 3 - Conceptual Recycled Water System

1000 0 1000 2000 3000 4000 5000 FEET

Drawn: LRC| Reviewed:WJW

HMH#3200.03 |03/13/07

4.0 STORM DRAINAGE SYSTEM

Existing Facilities

The existing Santa Teresa system begins near Bailey Avenue with a 36-inch reinforced concrete pipe (RCP) and gradually increases in diameter to a 60-inch RCP as it runs north. The existing 60-inch RCP has been recently connected to the existing 12' by 12' reinforced concrete box culvert (RCB) where Fisher Creek crosses Santa Teresa Boulevard, as part of the CVRP flood control improvements.

The existing storm drain system in Bailey Avenue includes a 48" RCP storm drain east of Santa Teresa Boulevard and a 60" RCP storm drain west of Santa Teresa. When the Bailey system was constructed, the flood control plan for Fisher Creek included a lower elevation for Fisher Creek. The existing 60" RCP is constructed lower than Fisher Creek with temporary outfalls stubbed at a storm drain manhole and connects to a temporary 24" RCP outfall into Fisher Creek.

South of Bailey Avenue and east of Monterey Road formal drainage systems are generally limited to roadside swales and isolated culverts. At the Bailey Avenue Extension, a 48-inch outfall was constructed to drain the new roadway and pick up some of the overland flow along Monterey Road, but the collection system leading to this pipe will not be completed until the next phase of the Bailey project.

Objectives

The Coyote Valley Specific Plan presents the opportunity to design a primary storm drain system that conveys stormwater and urban runoff with the efficiency of a traditional hard pipe system, while having a positive effect on the environment and also meeting the NPDES Permit objectives of the Santa Clara Valley Urban Runoff Pollution Prevention Program. Other objectives include:

- Meet or exceed all NPDES Permit C.3 requirements
- Stormwater pollution prevention and treatment - biofiltration of stormwater/urban run-off
- Detention – provide flood protection for storm events/water quality measure for small storms, also eliminate erosion of creek bed and banks due to increased volume and duration of runoff from new paved surfaces – hydromodification management plan (HMP).
- Environmental/biological enhancement – provide mitigation and habitat areas
- Visual/aesthetic amenity
- Efficient use of land – open spaces/roadway landscape areas/water quality and ball fields/community parklands serve dual purpose as detention areas

Design Criteria

The following design criteria, which will be used for the proposed bioswales and biofiltration facilities, are consistent with the specifications contained in the California Stormwater Best Management Practice Handbook – New Development and Redevelopment, produced by the California Stormwater Quality Task Force, January 2003, and are consistent with the numeric sizing criteria for post-construction treatment control measures contained in Provision C.3 of the Santa Clara Valley Urban Runoff Pollution Prevention Program's NPDES Permit.

Bioswales and Biofiltration Facilities

- Parkway Bioswale Feature
    - Runoff will be determined using the Rational Method formula Q=CiA, where Q = flow (cfs), C = runoff coefficient, i = rainfall intensity (inches/hour), and A = total watershed area (acres).
    - Mean Annual Precipitation (MAP): 16 inches for Coyote Valley area.
    - Intensity shall be determined by the methods described in the County of Santa Clara County Drainage Manual, dated March 1966 (either IDF curve or intensity equations from charts) and be based on the 10-year event.
    - Trapezoidal open channel design:
        - ◊ Side slopes: 3:1 maximum (4:1 or flatter for turf planting to allow for mowing)
        - ◊ Longitudinal slopes: 2% maximum
        - ◊ Bottom width: 2-ft min/8-ft maximum
        - ◊ Depth: 7 ft. maximum
        - ◊ Width: overall width is 40-ft. maximum, with 2-ft benches at top on either side
        - ◊ Low velocities (or flat [zero] slope with adequate permeability and drainage through filtration soils)
        - ◊ High residence time – pervious soils, underdrained to avoid vector problems
    - Full Vegetation
        - ◊ Good cover or mulch and spaced plantings, or turf grass
        - ◊ Irrigation with recycled water during dry season
        - ◊ Varied plant types: herbaceous, shrubs, small ornamental trees
        - ◊ Root/rhizome structure to hold soil
        - ◊ Not dormant during flood/treatment period
        - ◊ Some plants may be allowed to root beneath the bioretention treatment system, beneath or around the subdrain depth
        - ◊ Permanent irrigation necessary, unless roots to shallow groundwater or capillary zone above
    - Filter fabric for residence (optional)
    - Full subdrain system, with drain rock

- Drain inlet structure for flows above water quality design volume or flow
- Trash structure
- Energy dissipator (e.g. rip-rap, drain-rock)
- Check dams or weirs

- Roadside Swale
  - "U", "V", or "J" open channel ditches
  - Natural vegetation (hydro-seed) or mulch around landscape plantings
  - Subdrain with drain rock

- Vegetated Filter Strip
  - Slope: 2% maximum
  - Width: Varies depending on tributary area
  - Vegetation: Grass
  - Flow velocities: Not to exceed 1fps

- Detention Ponds/Basins
  - Capture Volume: The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology established in the *California Stormwater Best Management Practice Handbook*, using local rainfall data.
  - Outlet Structure: Designed to discharge the capture volume over a period of hours - complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours.
  - Inlet Structure: To be located at low point of basin, and to include energy dissipation feature to reduce re-suspension of accumulated sediment.
  - Pond Depth: Maximum 6 to 8 feet (2 to 5 feet optimum depth). Bottom: 1% minimum slope to drain.
  - Pond Side Slopes: Minimum 10:1, maximum 3:1.
  - Maintenance Ramp & Perimeter Access: To be included in the design, where feasible, to allow maintenance activities and vector surveillance.

- Basin Construction: Earthen, with grassy vegetated surface. Emergency spillway to be included. Fencing included to restrict access, where appropriate.

- Erosion Protection At Outfall: Discharge pipes to have flared end sections for discharge points located at or near stream inverts. Channel immediately below outfall to be modified to conform to natural dimensions and lined with riprap over filter fabric.

Conventional Piping System

Localized drainage systems will be designed using the Rational Method formula Q=CiA, where Q = flow (cfs), C = runoff coefficient, i = rainfall intensity (inches/hour), and A = total watershed area (acres).

- Mean Annual Precipitation (MAP): 16 inches for Coyote Valley area
- Intensity shall be determined by the methods described in the County of Santa Clara County Drainage Manual, dated March 1966 (either IDF curve or intensity equations from charts.) and shall be based on the 10-year event.
- Time of Concentration: T_c = inlet time + flow time in pipe
- Full or half-full flow velocity in pipe = 2 ft/s (minimum)
- Manning's Roughness Coefficient for pipe friction losses – "n" value:
  - "n" value = 0.013 (minimum) for reinforced concrete pipe (RCP)
  - "n" value = 0.010 (minimum) for HDPE and PVC
- Hydraulic grade line analysis for a storm drain system shall be based on the flood surface elevation of the receiving stream.
- Cover over the pipe shall be 3.5 ft minimum.
- Minimum slope of the pipe = 1% for laterals; based on minimum velocity for mains)
- Manhole spacing = 450 ft (maximum)
- Inlet spacing = 500 ft (maximum – residential)
- Inlet spacing = 600 ft (maximum – industrial/commercial)

Storm Drainage System Conceptual Layout

The proposed storm drain master plan for the project (Exhibit 4) conceptualizes a system that mimics the way nature uses vegetated depressions, wetlands, and marshes to clean pollutants from stormwater. The proposed system replaces traditional hard pipe and storage facilities, where practical, with vegetated conveyance and storage facilities that also perform biofiltration of stormwater prior to discharging it to receiving waters (i.e. Coyote and Fisher Creeks, and ultimately South San Francisco Bay). The areas reserved for open space and recreational uses in the Land Use Plan have been evaluated and incorporated into this concept for stormwater use based on their proximity to effective floodplains, location within a post-development tributary drainage area, efficiency of land use, and existing drainage characteristics of the Valley.

The following facilities are considered part of the "backbone" system to which all stormwater runoff will be conveyed.

- Bioswales in median areas in Coyote Valley Parkway and other divided roadways
- Roadside swales
- Detention storage basins and appurtenances
- Conventional pipelines in other major streets
- Outfalls to Fisher Creek

Relocated Fisher Creek, Coyote Valley Lake, and the Urban Canal are integral parts of the storm drainage system as discussed in the Hydrology Report (Appendix J). Pipelines in subdivisions, inlets, and laterals are also project components but are not included in this conceptual plan.

Components

<u>Bioswales and Biofiltration</u>

- Parkway Bioswales
    - Trapezoidal open channel
    - Full vegetation
    - Filter fabric
    - Subdrains
    - Inlet sediment settling pond
    - Drain inlet structure for high flow bypass
    - Trash structure
    - Conveyance pipe
    - Culvert
    - Check dam/weir
    - Bioretention function included in all swales: permeable soils (2 foot depth), gravel underdrains beneath feature drained to storm drain system.

- Roadside Swale
    - "U" or "V" open channel ditches (flat lands, where slopes <10%)
    - "J" open channel ditches (hillsides, where slopes > 10%)
    - Natural vegetation (e.g. hydro-seed)
    - Drain inlet structure
    - Subdrains
    - Conveyance pipe
    - Bioretention function included in all swales: permeable soils (2 foot depth), underdrains beneath feature drained to storm drain system.

Conventional Piping

- Conveyance Pipe Trunk
- Conveyance Pipe Collector
- Drain Inlet Structure allows entry of high flows that exceed water quality flows.
- Manhole Structure
- Carries underdrain flows and high flow bypass of treatment features